destroyed, while two very tall and isolated houses at a short distance escaped. One of these houses has a side-wall nearly 60 ft. high, and another one supported by other houses. The same partial effect was observed in other places, the terrestrial disturbance having been, as it were, distributed in veins or currents, in the line of which everything went down; but outside of these limits the damage done was comparatively slight. The exaggerated accounts published of the loss of life and injury to the city have probably never been exceeded.

We hear from the province of Albay (the southern extremity of the island of Luzow) that the grand volcano, the Mayon, was again in eruption, though at the last advices no damage had been done. This is perhaps the most beautifully symmetrical volcano in the world. From almost every point of view the outline is equally elegant. A few years ago I was fortunate in witnessing a fine eruption of the Mayon, which lasted for many days. By means of a powerful telescope I was able to watch its progress from a station at the base of the mountain. The ejected matter appeared to be red-hot stones only,* nothing like lava streams being visible. Indeed most of the volcanos of the Philippines throw out only scoria, ashes, and, it is said, in some cases hot water; but all information on these subjects is so liable here to gross exaggeration, that little dependence can be placed on anything but personal observation.

Another volcano, about 20 or 25 miles from the Mayon, called the Bulusan, which has been dormant for many years, began to throw out columns of smoke soon after the eruption of the Mayon, which I witnessed.

I regret I have not been able to ascertain whether these volcanic disturbances have had any effect upon the thermal springs of Tivi at the base of the Mayon in causing an intermission in the flow, &c. The waters of these springs, which are very limpid, deposit large quantities of silicious scuter, which encloses anything thrown into them. I have a piece of ordinary mat, which, in vulgar phrase, is completely petrified. The temperature is nearly boiling; but it is dangerous to approach the openings too nearly, and thermometrical experiments are difficult. Some of the concretions from certain parts of these springs are very massive, and when broken appear to be a nearly transparent silex.

Manila, Oct. 7 W. W. WOOD

P.S.—The post brings further accounts of the new eruption of the Mayon, which has assumed a formidable character, and is said to be the most violent which has occurred for many years. Some lives have been lost among the natives, who have their Manila hemp plantation on the flanks of the volcano, and great apprehension prevailed in all the villages around the base of the mountain. The new volcano on the island of Camiguin remains in a semi-active state—smoking, but without any regular eruption. Those who have visited it lately report that it is steadily increasing in volume, the irregular mass becoming larger daily, and working towards the sea. The inhabitants have generally returned to the island, but the villages in the immediate neighbourhood of the volcano are still deserted. Camiguin is important from its plantations of Manila hemp (*Musa textile*), and a good deal of capital is invested in them.

Oct. 10

Atmospheric Refraction

IF Mr. Wallace is still in search of facts on unusual atmospheric refraction, I would refer him in the first place to "Scoresby's Arctic Regions," and Scoresby's "Greenland," in both of which works very full and accurate information is given as to facts observed by the author; in the second place to the Phil. Trans. for 1798, 1799, and 1800, containing papers by Latham, Vince, and Wollaston; thirdly, to "Annales de Chimie," first series, vols. 29 and 39; the former containing a paper by Monge at p. 207, and the latter a paper by Gorsse at p. 211.

More recent observations are described in NATURE for July 28 and August 25, 1870, and August 25, 1872.

If any of your readers can inform me of any important contributions to the literature of Mirage besides these above mentioned I shall be greatly obliged.

J. D. EVERETT

BIELA'S COMET*

"BIELA'S Comet is my subject this time. A startling telegram from Prof. Klinkerfues on the night of Nov. 30 ran thus:—'Biela touched Earth on 27th: search near Theta Centauri.'

"I was on the look-out from comet-rise (16^h) to sunrise the next two mornings, but clouds and rain disappointed me. On the third attempt, however, I had better luck. Just about $17\frac{1}{4}^h$ mean time, a brief blue space enabled me to find *Biela*, and though I could only get four comparisons with an anonymous star, it had moved forward $2^s{\cdot}5$ in four minutes, and that *settled* its being the right object. I recorded it as—'Circular; bright, with a decided nucleus, but no tail, and about 45″ in diameter.' This was in strong twilight. Next morning, Dec. 3, I got a much better observation of it; seven comparisons with another anonymous star; two with one of our current Madras Catalogue Stars, and two with 7734 Taylor. This time my notes were—'Circular; diameter 75″; bright nucleus; a faint but distinct tail, 8′ in length and spreading, a position angle from nucleus about 280°.' I had no time to spare to look for the other comet, and the next morning the clouds and rain had returned.

"If I get another view before posting this I may be able to add a hasty postscript. The positions, the first rough, the second pretty fair from the two known stars, are—

	Madras M.T h m s	R A h m s	(Apparent) P.D. ° ′ ″
Dec. 2	17 33 21	14 7 27	124 46
3	17 25 17	14 22 2·9	125 4 28

HINTS ON COLLECTING ARACHNIDA

IT having been suggested to me by Mr. Sclater that a few hints on the collecting of *Arachnida* might be of use for natural history collectors and travellers in foreign parts, I have had great pleasure in drawing up the following notes on the subject, and shall be glad to receive collections of these animals from any part of the world.

1.—What are *Arachnida?*

These are Spiders, Scorpions, Harvestmen, and Mites with several other allied groups (which have no English names), such as the *Thelyphonidæ*, semi-scorpion-like creatures with a slender palpiform tail, and of considerable size; the *Phrynidea*, short-bodied creatures of a somewhat spiderish appearance, but often of large size, with a horny skin, and fore-legs of immense length and great slenderness; and the *Solpagidæ*, creatures which, if they can be said to resemble any others, are perhaps more like abnormal-looking spiders with a heavy head and great double jaws than anything else.

2.—What places do *Arachnida* live in?

Little need be said on this, for there is no place so barren, or so fertile, or so wet, or so dry, or so stony, but that some, and generally most, of the *Arachnida* may be found in it. Collectors abroad are often prevented from collecting birds or insects by weather, but *Arachnida* may be got in any weather, even if the collector be confined to the house. Numerous species may be found in corners and crevices; beneath old bark, or detached rocks and stones, myriads of spiders haunt. They are also to be found among moss and *debris* in damp places, in holes, in banks and river-sides; among the lower stems of grass and rank herbage, and the borders of swamps and ponds; on tree trunks, among lichens, on bushes, in blooms of flowers—in fact, to repeat it, everywhere; often moving in the hottest sunshine, and often concealed during the day, coming abroad at dusk and in the night.

3.—How to collect *Arachnida.*

The mere modes of capturing them need not be much detailed; there is an advantage in respect to *Arachnida* over all the *Insecta* in their being unable to fly. The

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* These appeared as if slowly pushed up from the interior of the crater, and, rolling out over its edges, went thundering down the cone, throwing out showers of fire as they struck the rocks or each other. This eruption was well seen by me from two opposite stations, and was said to have been equally fine when viewed from all sides of the mountain.

* Extract of a letter from Mr N. R. Pogson, Madras Observatory, to the Astronomer Royal, dated Dec. 5, 1872.

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greater number may be seized with the fingers with a little practice, and immediately plunged into a bottle of spirits of wine, or any other strong spirit; but many large ones may be boxed with large pill-boxes (of course, only one in each box), and at the end of the day may be suffocated with brimstone or chloroform, and then put into the spirit. Where a collector is collecting insects, he may catch many swift-running or strongly-jumping spiders by placing his open net in front and driving them into it with the other hand. A large umbrella is a first-rate implement for beating boughs or long herbage into.

4.—What to do with *Arachnida* after having caught and bottled them.

All that need be done is to put as many into a bottle as can be fairly got into it. There is no need to put large specimens into one bottle and small into another; for it is found practically that a judicious mixture of large and small is of no disadvantage, but rather the contrary.

One special point to be always observed is to fill up the bottle, where the specimens do not quite do so, with small bits of soft paper crushed up and gently inserted, until the contents fail to move about with the motion and shaking of the bottle.

The best bottles are ½ oz. phials, 1 oz., 2 oz., and 4 oz. wide-mouthed ditto, all of which are kept in stock by chemists or bottle-makers in England. The smallest of these will hold a large number of small specimens, and the largest are large enough for all except a very few of the gigantic *Mygalidæ* and scorpions; for the latter it must be a barren region which will not furnish an empty pickle-bottle capable of holding some scores of the largest species. Tight corking is, of course, necessary, and in hot regions tying down of the corks.

Of course any notes on the sexes of species or their habits, &c. as well as on their colours, as these sometimes fade in spirits, are valuable; and where notes can be made, there should be a supply of test tubes of various sizes into which the example noted should be placed with a written card or letter, with a parchment number corresponding with the numbered note. The tube should then be filled with spirit and stopped firmly with a piece of cotton-wool, and placed *wool downwards*, in one of the wide-mouthed phials. A number of tubes may thus be packed into a phial, but spirits should also be always put into the phial as well as into the tube.

Where there is a fear of handling spiders of large size, or scorpions, a simple pair of forceps may be made of a piece of bent hoop-iron, rivetted at the bend through a piece of inserted tough wood, this gives sufficient spring to keep the digital joints always extended a little way. With these forceps *Arachnida* of a large size may be safely caught, or extracted from holes and crevices.

Mr. Bates' plan for killing the Mygales on the Amazons, was to get them into a tin pot or box, put the cover on, and place it for a few minutes upon the glowing embers of a charcoal fire. These means of killing may be used where neither brimstone nor chloroform are available.

From the above hints it will be seen that, compared to the trouble of collecting birds, mammals, or insects which require careful setting and drying, the trouble of collecting and preserving *Arachnida* is *nil*, and in all tropical regions an intelligent native would collect hundreds of specimens in a day if he were only furnished with two or three large bottles full of strong spirit.

Thus all that is necessary for the complete equipment of a collector of *Arachnida* is a large umbrella, a pair of forceps (such as are above described) about twelve inches long, two or three dozen of the bottles above-mentioned, a hundred or so of test-tubes of different sizes, a little cotton-wool, soft paper, and some strong spirit, which may be got on the spot nearly everywhere.

O. P. CAMBRIDGE

INTRODUCTORY LECTURE OF THE MURCHISON CHAIR OF GEOLOGY AT EDINBURGH, SESSION 1872–3*

BEFORE entering on the special subjects to be treated of in the following course of lectures, it is most desirable that we should definitely shape to ourselves the objects we have in view. By doing so we can the better take stock from time to time of our gains, and judge at the end how far we have succeeded in achieving any solid advantages.

Now, if I put the question frankly to you, What do you propose to accomplish by voluntarily placing yourselves under such a course of instruction as that which begins here to-day? you will, perhaps, reply that your desire is to know something more of a science which offers to your minds so many points of interest.

The task you have undertaken promises to be a pleasant one, and possibly all the more so since there may be a very general impression among my audience that your duties here will be rather an exercise of the memory than of the reasoning powers, and hence a not unwelcome relief from severer studies.

I should be sorry to dispel so pleasing a belief; on the contrary, it would give me some assurance that if our conjoint efforts fail the fault will lie with me, and not with you. Nevertheless, I have a deep conviction that, in seeking here merely an addition to your knowledge, you would neither do justice to the subject we are to study nor to yourselves.

I know only too well that the imparting of knowledge is popularly supposed to be the only aim and purpose of natural science teaching, and that this notion pervades our system of education. I believe it to be but a partial view of the truth; and even at the risk of being thought dull I would lay before you another view, that you may see what additional objects you may, in my opinion, accomplish here, besides storing your minds with facts.

No one who thoughtfully considers the state of public feeling in this country at the present time can doubt that we are on the eve of educational changes more momentous than any which have come to pass for centuries. It is not merely that education has become a political cry; that it forms a staple element in the declamations which fill the air from the halls of St. Stephen's to the village green; and that all this oratory finds further exposition and enforcement in the public prints. It is not merely that we believe it will be hard, a generation hence, to find a man or woman throughout the land who cannot at least read and write. These results, profoundly important as they are, do not fill up the whole measure of change which is impending, nor are they those which most nearly concern you and me at present.

It is impossible that such radical reforms should be worked in the primary education of the country without an influence, and perhaps an extremely potent one, upon the higher forms of culture. On every side, indeed, we can already descry indications of the coming changes—changes, however, which are not wholly, nor even, perhaps, chiefly, due to the disturbances of our primary educational system, but which would assuredly have been brought about, even had no sweeping Parliamentary legislation taken place.

Nowhere can these indications be more significantly seen than among those conservative educational centres, where it might have been supposed that the call for reform would have been longest in making itself heard and obeyed. Even there the old and time-honoured traditions are losing their hold. The young blood of a newer time has begun to quicken some of the most dormant of our institutions.

Uncompromising opposition is apt so to embitter a struggle, that what is at first only a desire for reform partakes in the end somewhat of the blind fury of a revolution.

* Given on Nov. 11 by Prof. Geikie, F.R.S.

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